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Value Stream Mapping in a Manufacturing Environment

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Presented By:
Rhonda Salzman
LAI Research Assistant

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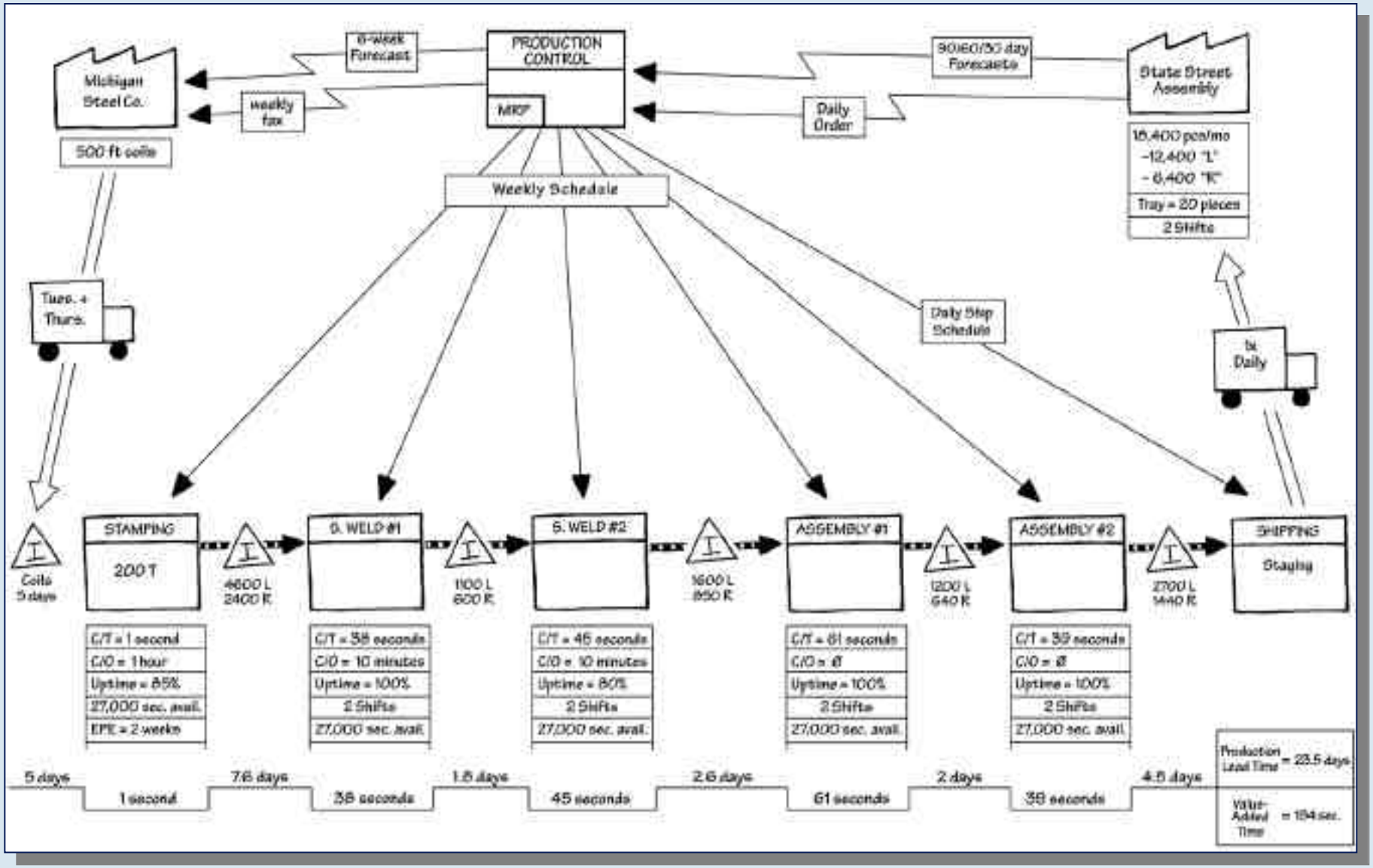
Current Value Stream Map



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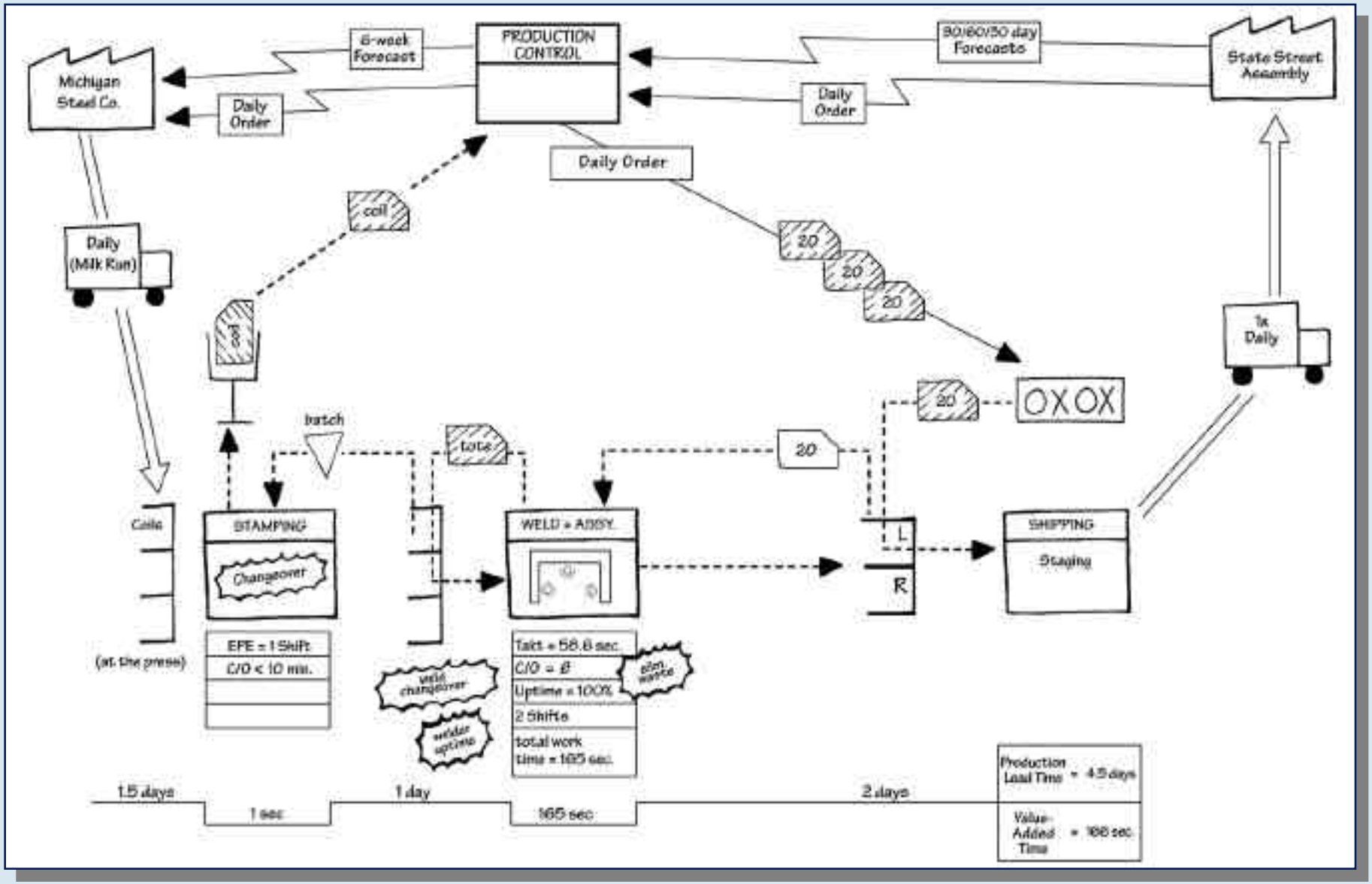
Future Value Stream Map



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Research Motivation

- Many instances where VSM has been seen to:
  - Help to identify wasted movements and steps
  - See flow of the product
  - Reduce lead times considerably
  - Save money!

But even with all these successes there are plenty of failures… **WHY?**

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Key Research Questions

- **Is there an environment where VSM is appropriate?**
- **How do you measure success of a VSM event?**
- **What are the limitations of VSM?**

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Is their an environment where VSM is appropriate?

5 Environmental Characteristics that help to determine the success of a VSM event:

- Ability to Generalize
- Product Complexity
- System Capability
- Type of Organization
- Investment

5 PROPOSED ENVIRONMENTAL CHARACTERISTICS

Ability to Generalize [1]	Product Complexity	System Capability	Type of Organization	Investment	Success/ Failure [7]

VSM appropriate

VSM not appropriate

(1) Ability to Generalize

- The ability to pick a representative part
  - Similar process steps as the majority of the products that go through the system
    - Information system, Product Flow, Cycle Times, Yields
  - Obsolescence of the map due to product or process changes.

If the map does not represent the problems of the area then it will solve the wrong problems.

(2) Product Complexity

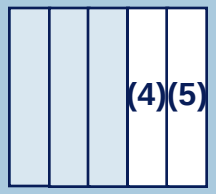
- **Level of difficulty associated with production of a part including serial and parallel processing.**

Product complexity affects the ability to differentiate between VA and NVA.

3) System Process Capability

- Generalized technological ability to repeatedly make something with minimal intervention and minimal disruptions (scrap, rework, shortages).

If the steps are unreliable, there will be no ability to use continuous flow.



(4) Type of Organization and (5) Investment

- **Type of organization - Level of innovativeness (change) supported on the factory floor.**

- **Investment - Availability of money and labor to make change.**

Without the availability of money, labor and leadership no implementation will occur.

5 ENVIRONMENTAL CHARACTERISTICS

Ability to Generalize [1]	Product Complexity	System Capability	Type of Organization	Investment	Success/ Failure[7]
All products go through the process depicted and the process drawn will not be changed[2]	Tasks per process box is 10 steps or less and all processes are serial[4]	Disruptions[6] almost never happen and variation in cycle time of a process box is negligible.	Senior leaders reinforce transition and foster improvement throughout the VSM.	Money and labor are in abundance	
The majority of the products go through the process depicted and they will not change before improvements can be made (1year)	Tasks per process box is greater than 10 steps and most processes are serial	Disruptions are low enough not to impede flow and variation does not impact flow	The organization promotes changes and improvements	Money, and labor are available but limited	
Half the products go through the process depicted and the process drawn might change in less than a year.	Tasks per process box is greater than 100 and the processes are a mixture of serial and parallel	Occasionally disruptions force out of sequence work and variation in cycle time impacts flow	Level of commitment among management is variable	Money and labor can be made available but an extensive justification process exists	
A few of the products go through the process depicted and the process drawn might change in the next few months	Tasks per process box is greater than 1000 and most processes are parallel[5]	Disruptions and variation in cycle time are barriers to continuous flow	VSM was initiated by upper management with no lower management support, or visa versa	Money and labor are hard to come by even if justified	
Only the product mapped goes through the process shown and the processes drawn might change next week, making the map obsolete.[3]	Tasks per process box is too many to count and all processes are parallel	Disruptions are a fact of life and cycle time of a process box is nearly impossible to predict	The VSM event was perceived as a check the box exercise	Money and labor are impossible to get	

VSM appropriate

SUCCESS

VSM not appropriate

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How do you measure success of a VSM event?

- **Types of success**
  - **Skills & knowledge (problem solving/lean)**
  - **Motivation for change**
  - **Broadening perspective (of flow of the product)**

Identification of solutions (and a way of measuring them)

↓

Attempt at changing the system (implementing the solutions)

↓

Achieving measured goal ★

5 ENVIRONMENTAL CHARACTERISTICS

Ability to Generalize [1]	Product Complexity	System Capability	Type of Organization	Investment	Success/ Failure[7]
All products go through the process depicted and the process drawn will not be changed[2]	Tasks per process box is 10 steps or less and all processes are serial[4]	Disruptions[6] almost never happen and variation in cycle time of a process box is negligible.	Senior leaders reinforce transition and foster improvement throughout the VSM.	Money and labor are in abundance	**1** An improvement was seen in the performance of the mapped area
The majority of the products go through the process depicted and they will not change before improvements can be made (1year)	Tasks per process box is greater than 10 steps and most processes are serial	Disruptions are low enough not to impede flow and variation does not impact flow	The organization promotes changes and improvements	Money, and labor are available but limited	**2** Improvements were made using additional projects, but not enough were initiated to see an improvement.
Half the products go through the process depicted and the process drawn might change in less than a year.	Tasks per process box is greater than 100 and the processes are a mixture of serial and parallel	Occasionally disruptions force out of sequence work and variation in cycle time impacts flow	Level of commitment among management is variable	Money and labor can be made available but an extensive justification process exists	**3** The event helped to recognize new opportunities but no implementation occurred
A few of the products go through the process depicted and the process drawn might change in the next few months	Tasks per process box is greater than 1000 and most processes are parallel[5]	Disruptions and variation in cycle time are barriers to continuous flow	VSM was initiated by upper management with no lower management support, or visa versa	Money and labor are hard to come by even if justified	**4** The event was a good way to record improvements that have already been suggested
Only the product mapped goes through the process shown and the processes drawn might change next week, making the map obsolete.[3]	Tasks per process box is too many to count and all processes are parallel	Disruptions are a fact of life and cycle time of a process box is nearly impossible to predict	The VSM event was perceived as a check the box exercise	Money and labor are impossible to get	**5** The VSM event did not help surface any issues

VSM appropriate

SUCCESS

VSM not appropriate

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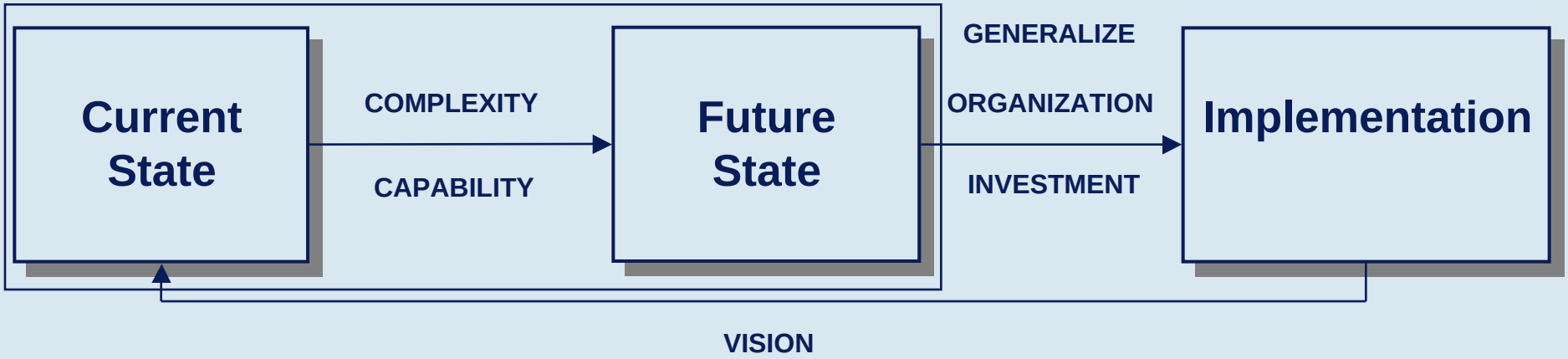
Link between environmental characteristics and success



Thoughts?

- Questions?
- Comments?
- Thoughts?

Survey

- Verification of matrix is necessary

- Currently working on
  - Case Study Visits and Conference calls
  - Web survey

    (Need Additional Surveys!)

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Data Correlation Options

- **All factors are equal**
  - **Corr. should be seen for every factor and total**
- **1 Factor or group is more important**
  - **Weighted average**
- **Any one factor can make or break it**
  - **Changes depending on the situation**

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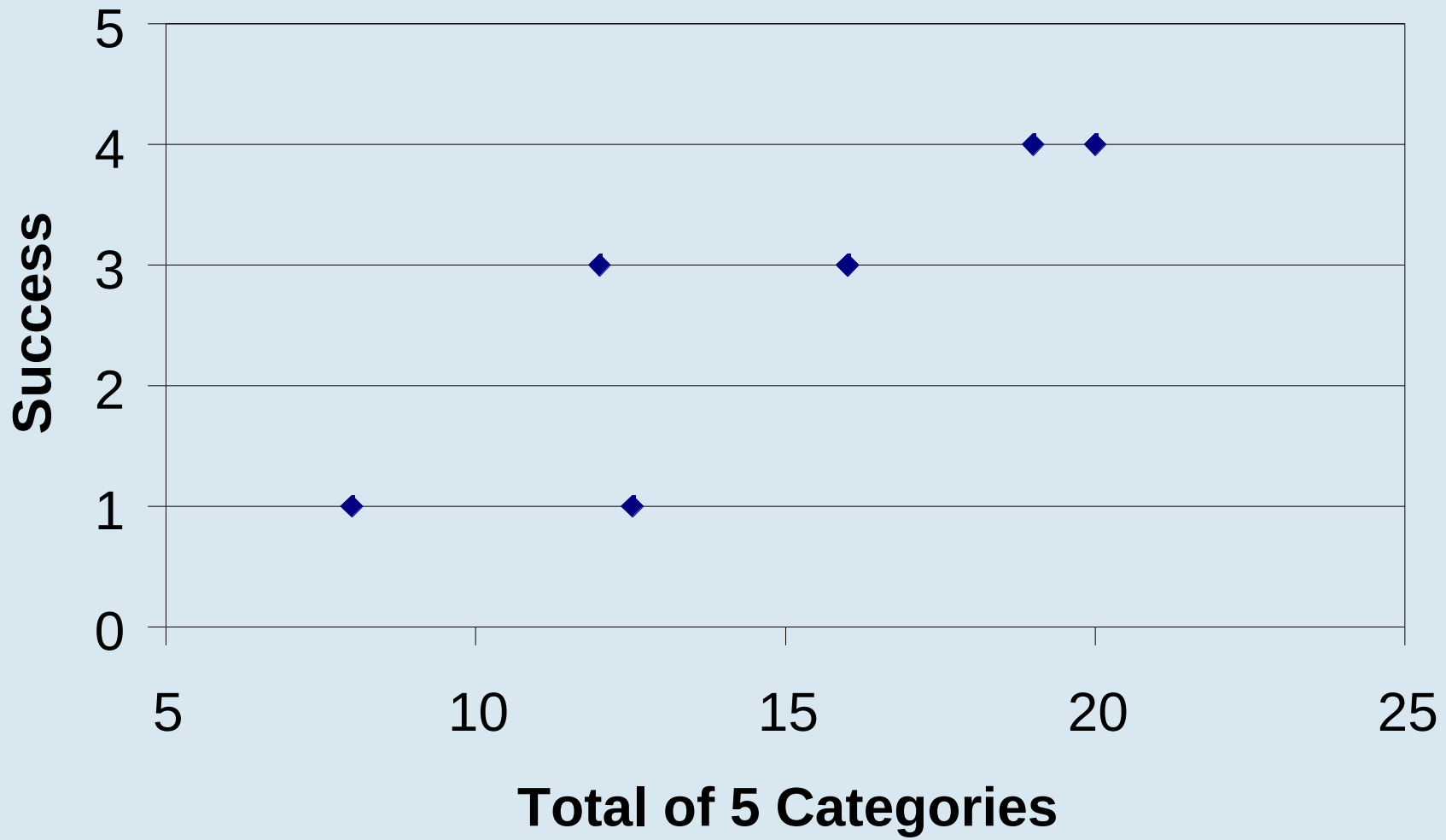
Case Studies



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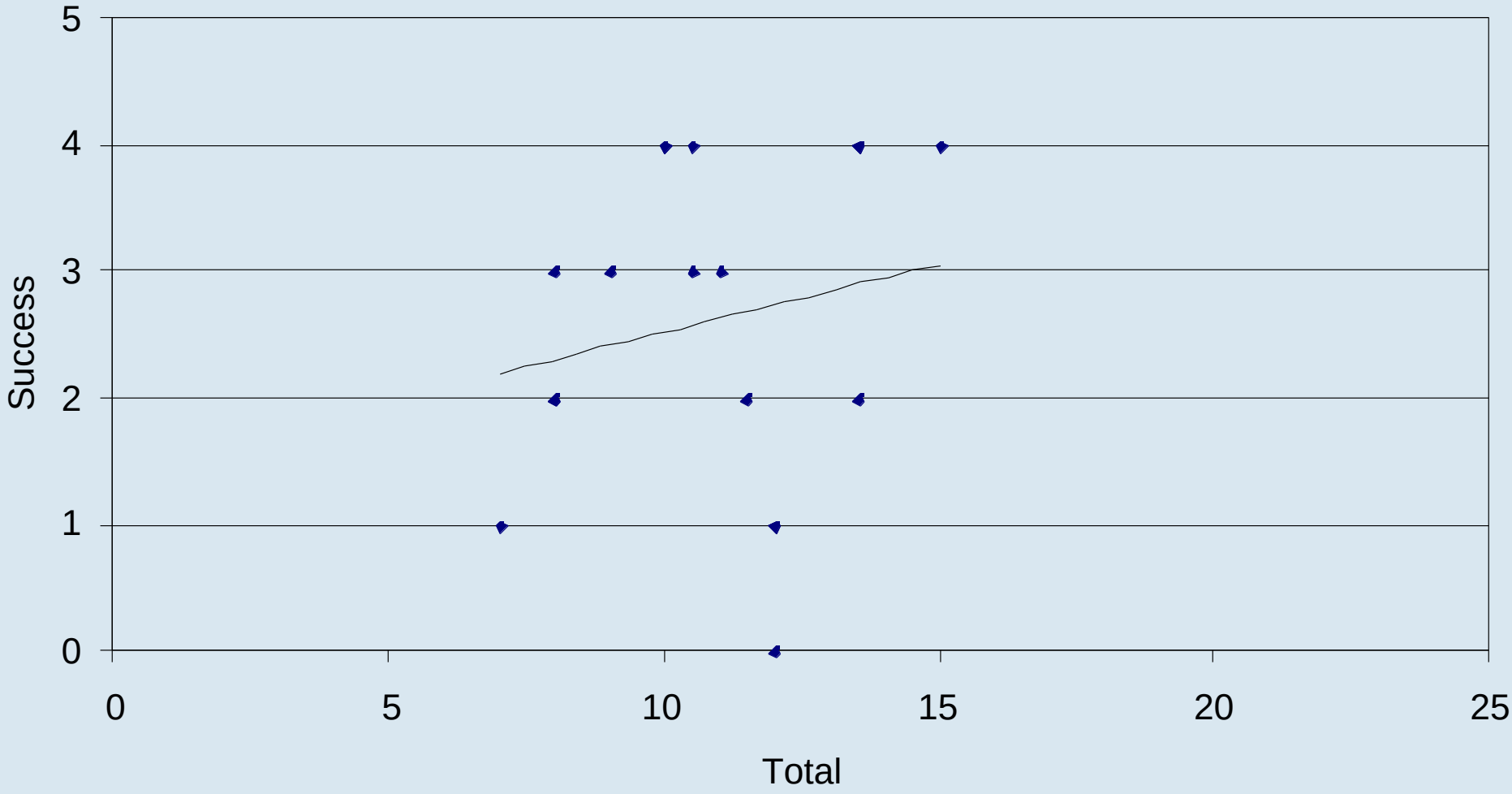
Non weighted all data



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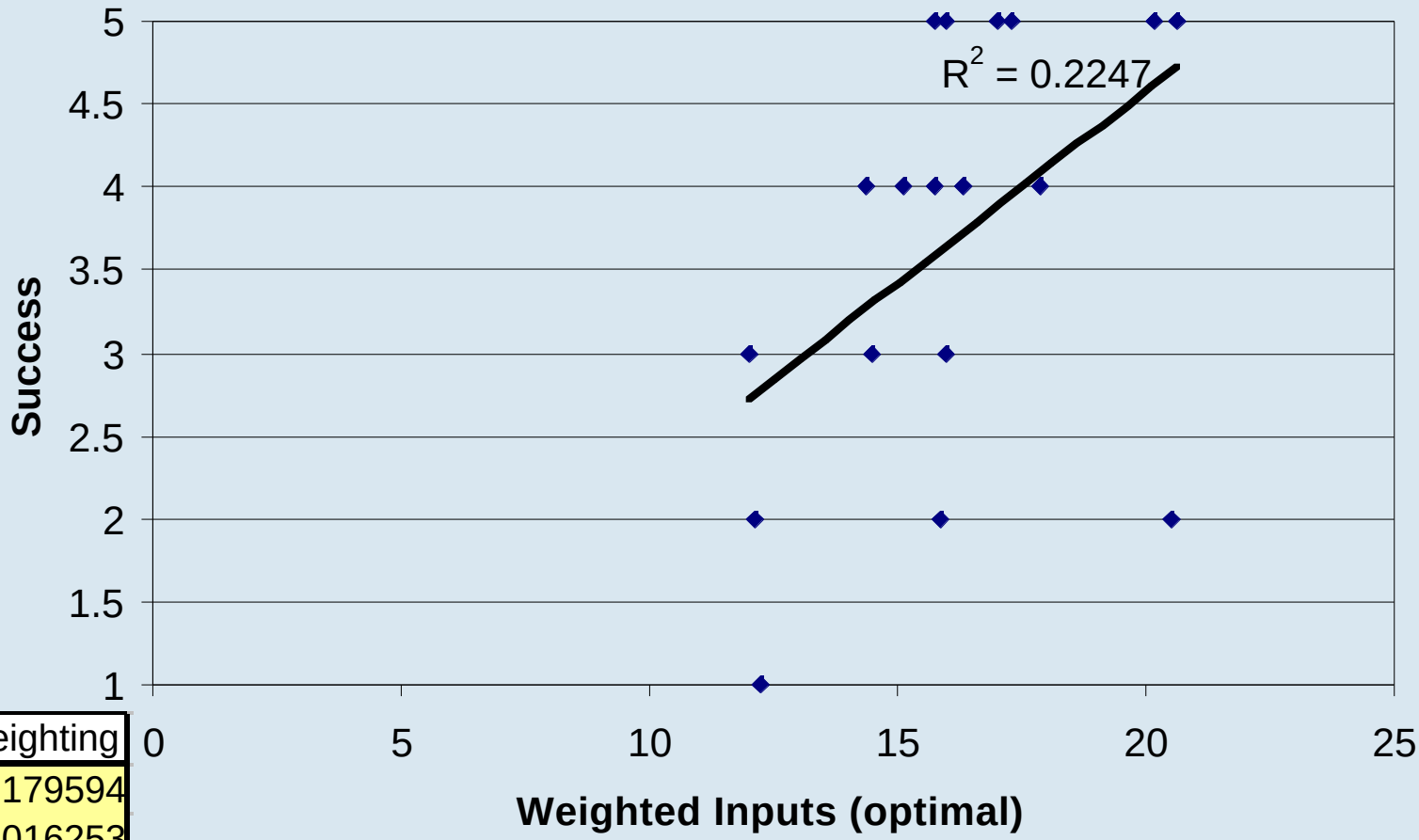
Weighted Correlation



	Weighting
Generalize	1.179594
Complexity	1.016253
Capability	0.414322
Organization	2.400227
Investment	0

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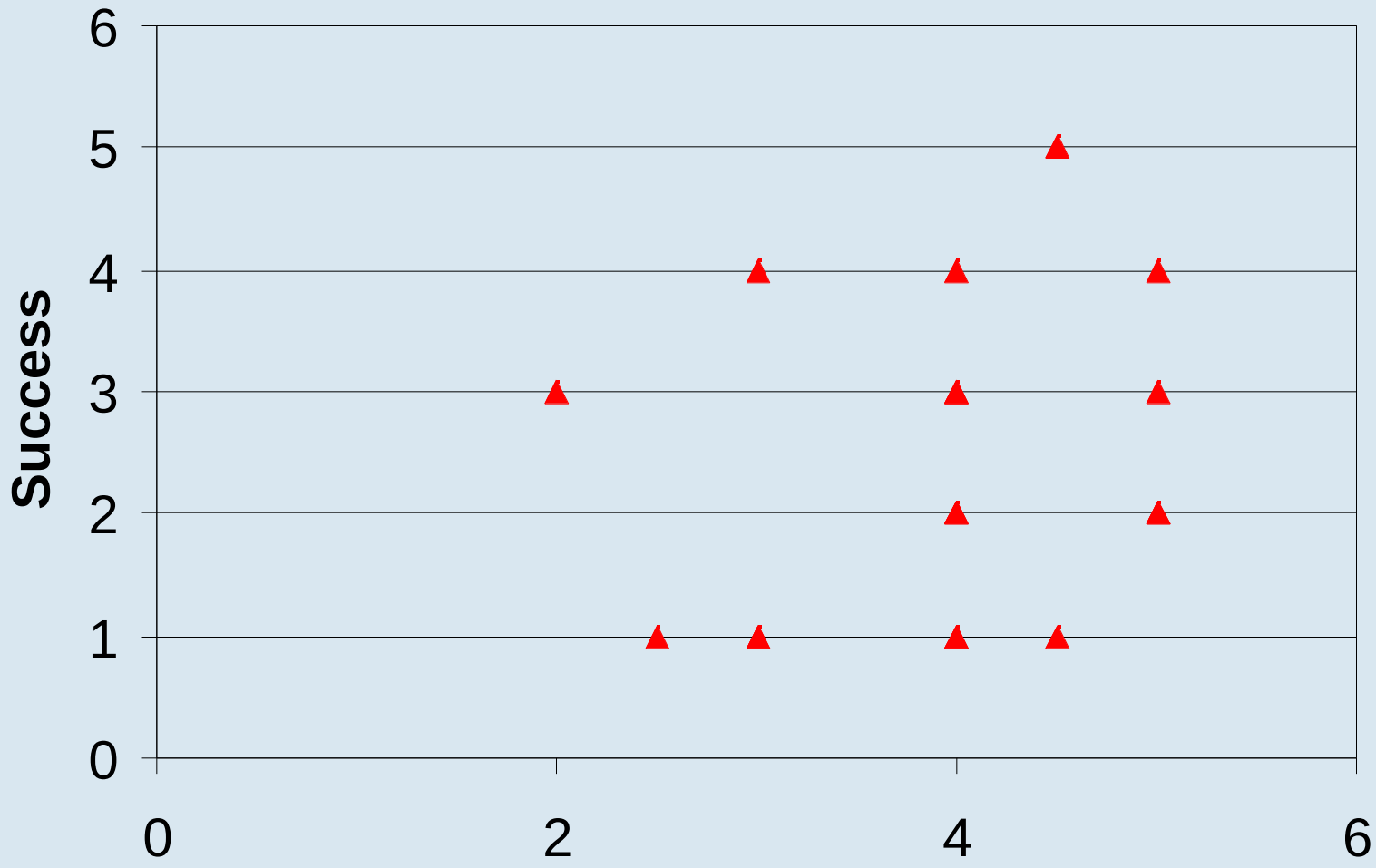
Low Hanging Fruit



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Conclusions

- 5 Proposed Environmental Characteristics
- Relationship between Characteristics and Success
- Survey can be found at
  - http://web.mit.edu/rsalzman/survey
- Recommendations welcome

